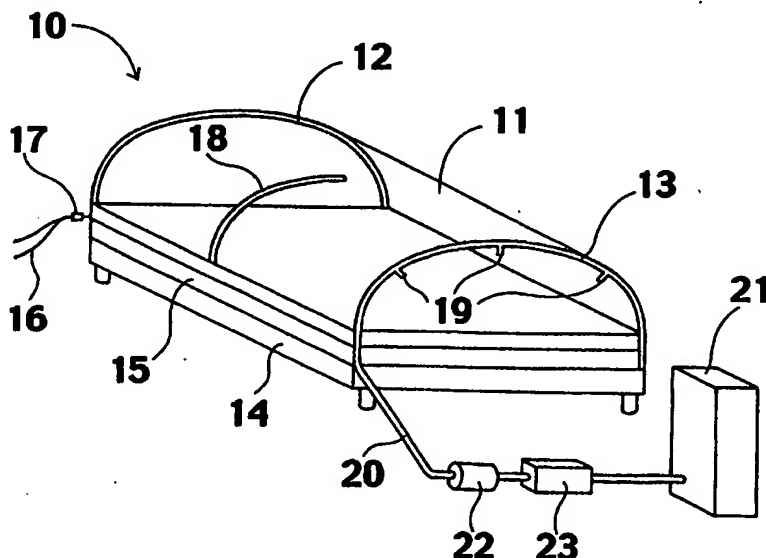




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(21) International Application Number: PCT/US98/13067 (22) International Filing Date: 23 June 1998 (23.06.98) (30) Priority Data: 60/055,087 31 July 1997 (31.07.97) US (71) Applicant: HYPOXICO INC. (US/US); Suite 249, 50 Lexington Avenue, New York, NY 10010 (US). (72) Inventor: KOTLIAR, Igor, K.; P.O. Box 2021, New York, NY 10159-2021 (US).		(81) Designated States: AU, CA, JP, NZ, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: HYPOXIC TENT SYSTEM



(57) Abstract

A portable/travel hypoxic system (10) for passive hypoxic training of athletes during rest. The system consists of a light portable tent (11) which is easily erected on a bed (14) or mattress (15). The tent has disassembled or deflated support structure (12, 13, 18). Oxygen-depleted air at 11 % to 15 % oxygen is transmitted inside the tent by a hypoxic gas generator (21) having a membrane separation or pressure swing adsorption unit. A HEPA filter (22), and air cooling device (23) are also available.

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HYPOXIC TENT SYSTEM

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Related Applications

10 This application is a continuation in part and improvement of preceding patent applications of Igor K. Kotliar: No. 08/505,621 "Hypoxic Room System and equipment for hypoxic training and therapy," filed 21 July 1995, 08/739,379 "Hypoxic Flow System for individual active and passive hypoxic training," filed 29 October 1996, and 08/797,242 "Apparatus for passive hypoxic training and therapy," filed 8 February 1997.

15

Field of the Invention

20 This invention relates to enclosed low-oxygen environments created for resting in for the purposes of improving the cardio-pulmonary system of professional athletes, and for improving the health of any user, including the sick, injured and disabled.

 The Hypoxic Tent System provides a safe low-oxygen environment at normal atmospheric pressure at simulated altitudes up to 15,000 feet or higher for sleeping in.

25

 The benefits of the inhalation of low-oxygen gas mixtures are fully described in previous patent applications 08/505,621, 08/739,379 and 08/797,242, and have recently been the focus of worldwide media attention. An athlete sleeping at a simulated altitude will increase his pulmonary ventilation and red blood cell count, and will need less oxygen to achieve the same performance level. This means his performance will improve in a normal oxygen environment. Hypoxic training may also be used in preparation for competition at high altitudes.

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The invention presented here provides a convenient, low cost solution to create such an environment for sleeping. This invention makes it possible to make a portable version of the Hypoxic Room System, convenient for athletes while traveling, and may be easily installed at home or in any hotel room.

5

The Hypoxic Tent System can also be used as a therapeutic device to increase strength and endurance and boost immunity. The disabled can use this system for training their cardio-pulmonary systems.

10 Prior Art

The U.S. Patent No. 5,467,764 of November 21, 1996, "Hypobaric Sleeping Chamber," shows hypobaric sleeping chamber, which is used by some athletes for sleeping in for the purposes of improving pulmonary performance. This invention has significant drawbacks.

15 Firstly, this chamber must be completely sealed, which requires rigid construction, and is unsafe. Also, it has a negative psychological effect, since the user is cut off from the outside world and is confined inside a narrow tube. Further, the low pressure and dryness created inside this chamber can cause rapid dehydration, enlargement of internal organs, headaches, and irritation of the sinus and respiratory system.

20

Description of the Invention

Figure 1 shows a schematic view of the most preferred embodiment 10. A tent 11 is fitted onto a bed 14 and upheld by supporting arches 12 and 13, which are first fastened onto
25 the sides of a mattress 15 preferably by means of a drawstring or an elastic band (not shown). Tent 11, having a drawstring 16 with a locking device 17 at its bottom edge, is additionally tightened over the sides of mattress 15.

Tent 11 is made of light, thin fabric such as parachute nylon or synthetic material such as
30 clear vinyl or a combination of both. The most preferred material is one, which will allow the fast diffusion of moisture from tent 11. Tent 11 has an entryway 18, which can be closed preferably by a zipper, ziploc mechanism, Velcro, magnetic tape or other closing device, openable and closeable from the inside or outside of tent 11.

Supporting arches 12 and 13 are preferably made from light metal or plastic tubes which can be disassembled in segments. Arch 13 is fitted to tubing 20 on one end, is closed on the other end and has discharge nozzles 19 inside tent 11. A hypoxic generator 21,
5 described in previous patent applications, supplies low oxygen air into tent 11 through tubing 20, arch 13 and discharge nozzles 19.

Tent 11 can also have an inflatable supporting structure instead of the supporting tubing of arches 12 and 13.

10 A filter 22 filters the low oxygen air of airborne particles and bacteria. The most preferred type of filter is a HEPA filter, which is widely available from a number of manufacturers. An optional air-cooling device 23 may be installed in the system to cool the low oxygen air for comfort. The cooling effect may also be achieved by increasing the length of tubing 20 if the ambient air outside tent 11 is already cool. For hot and humid climates, a
15 separate air conditioning unit (not shown) may be installed instead of cooling device 23. This separate air conditioning unit would draw in air from tent 11, cool and dehumidify it and recirculate it back into tent 11. However, in most cases, excessive water vapor and carbon dioxide, much faster than other gases, will quickly diffuse through the fabric of tent 11, and will escape along with exiting air.

20

Hypoxic generator 21 draws ambient air in and separates it into oxygen enriched and oxygen depleted fractions, employing membrane separation or pressure-swing adsorption technologies. The oxygen enriched fraction is expelled from hypoxic generator 21 and the oxygen depleted fraction, having an oxygen content preferably from 11 to 15 percent, is
25 constantly pumped into tent 11. A standard hypoxic generator made by Hypoxico Inc. supplies approximately 60 liters/minute of hypoxic air with a 15% oxygen content, which corresponds to an altitude of 8,500 feet, providing the most suitable and safe environment for hypoxic training during sleep. Air pressure remains near normal inside tent 11 as a result of air exiting gaps in the tent construction, which does not have to be airtight. For
30 example, air can exit around the zipper or other closing mechanism of entryway 18, as a result of the looseness of drawstring 16 and through fabric pores. Additional air escape openings may be provided as well, if necessary.

Hypoxic tent system can be easily disassembled and packed in luggage.

Claims

What is claimed is:

- 5 1. A system for providing a reduced-oxygen atmosphere for breathing to a user; said system comprising:
- an oxygen-extraction device having an inlet taking in ambient air and first and second outlets, said first outlet transmitting oxygen-enriched air and said second outlet
10 transmitting oxygen-depleted air;
- a breathing chamber having an internal space therein and an entry communicating with said internal space and through which the user can enter said internal space;
- said second outlet communicating with said internal space and transmitting said oxygen-depleted air to said internal space and
15 said first outlet transmitting said oxygen-enriched air to a location wherein it does not mix with the atmosphere in the internal space.
2. The invention according to claim 1 and
 said entry closable preferably by zipper, ziploc mechanism, Velcro or magnetic tape, and
20 when closed, dividing said internal space from the external atmosphere.
3. The invention according to claim 1 and
 said breathing chamber made of soft synthetic or natural material and supported by supporting structure, which may be inflatable or assembled from segments made
25 preferably from metal or plastic material.
4. The invention according to claim 1 and
 said breathing chamber being attached to resting platform, preferably a bed, allowing user to rest inside said internal space while inhaling oxygen-depleted air.
30
5. The invention according to claim 1 and
 said internal space communicating with the external environment through naturally existing gaps, fabric pores or optional air-escape openings, allowing excess air to escape

breathing chamber and equalizing atmospheric pressure inside said breathing chamber to the outside parameter.

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6. The invention according to claim 1 and said second outlet communicating with said internal space through air filter and optional air-cooling device.

10 7. A portable travel system for providing a low-oxygen environment for a user comprising:

a breathing tent comprising soft walls supported by a supporting structure and an entry defining a closed space accessible to the user through said entry being selectively closable so that when closed, the tent is substantially isolated from the outside

15 environment;

a gas-processing device having outlet communicating with said closed space and transmitting oxygen-depleted gas mixture through said outlet inside said closed space.

8. The invention according to claim 7 and
20 said breathing tent designed to be attached to or erected on a resting platform, preferably mattress or bed, allowing the user to rest or sleep inside said tent.

9. The invention according to claim 7 and
said portable travel system designed for quick and easy installation and disassembly at
25 home or hotel room.

10. The invention according to claim 7 and
said portable system designated for use by athletes while sleeping or resting in order to improve their cardio-pulmonary systems and performance in normal oxygen environment.

30

11. The invention according to claim 7 and
said portable system designated for therapeutic use to increase strength and endurance and boost immunity.

12. The invention according to claim 7 and
said portable system designated for use by disabled to train their cardio-pulmonary
systems.

5

13. The invention according to claim 7 and
said tent made of material allowing water vapor to diffuse through.

10 14. The invention according to claim 7 and
said supporting structure made of metal or plastic segments.

15 15. The invention according to claim 7 and
said supporting structure being inflatable to support said breathing tent.

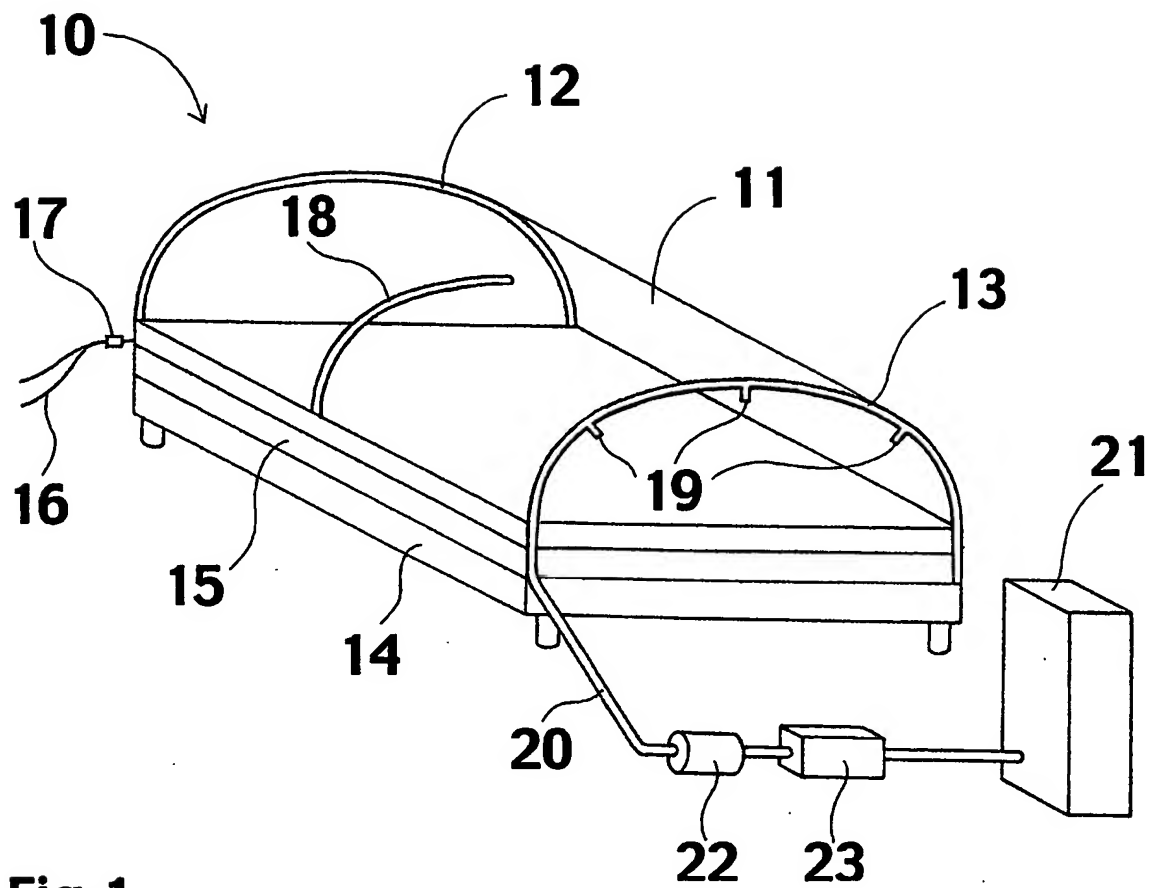
16 16. The invention according to claim 7 and
said gas-processing device employing membrane air-separation technology to provide
said oxygen-depleted gas mixture.

20 17. The invention according to claim 7 and
said gas-processing device employing pressure-swing adsorption technology to provide
said oxygen-depleted gas mixture.

25 18. The invention according to claim 7 and
said oxygen-depleted gas mixture being cleaned by HEPA filter and chilled by air cooler
before entering said closed space inside said tent.

30 19. The invention according to claim 7 and
said low-oxygen environment having oxygen content from 11% to 15%.

20. The invention according to claim 7 and
said portable travel system, which can be disassembled and packed in luggage for travel.

**Fig. 1**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/13067

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A62B 7/00, 9/00; A63B 23/18; G05B 1/00

US CL : 128/200.24, 202.12, 205.11, 205.26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 128/200.24, 202.12, 202.13, 205.11, 205.12, 205.26; 482/13

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
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NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5799652 A (KOTLIAR) 01 September 1998 (01.09.98), entire document.	1-20
Y	US 5,101,819 A (LANE) 07 April 1992 (07.04.92), entire document.	1-20
Y	US 5,109,837 A (GAMOW) 05 May 1992 (05.05.92), Abstract, and figures.	1-20
Y	US 4,974,829 A (GAMOW et al.) 04 December 1990 (04.12.90), Abstract, and figures.	1-20
Y	EP 0 113 149 A (GUIDA) 11 July 1984 (11.07.84), Abstract, and figures.	5
Y	AU 107,372 A (OGILVIE) 18 May 1939 (18.05.39), entire document.	3, 14



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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 29,119 A (POTTER) 23 December 1912 (23.12.12), entire document.	1-20
Y	GB 1,157,113 A (WAYNE et al.) 02 July 1969 (02.07.69), figure.	2
Y	GB 822,945 A (HIGGS) 04 November 1959 (04.11.59), figures.	2
Y	US 4,602,486 A (WEINSTEIN) 29 July 1986 (29.07.86), entire document.	6